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Hancock Expedition to the Galapagós Islands, 1933

GENERAL REPORT
BY
GEORGE HUGH BANNING



MARINE IGUANA, TAGUS COVE

SAN DIEGO, CALIFORNIA
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5. To provide for the delivery of lectures, the exhibition of pictures and the publication of literature dealing with natural history and science.
6. To operate a society for the mutual benefit of its members for non-lucrative purposes.



BLUE GALAPAGOS GULL, WITH YOUNG

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HANCOCK EXPEDITION OF 1933

TO THE GALAPAGÓS ISLANDS

GENERAL REPORT

BY GEORGE HUGH BANNING

AS I write, the wake of the *Velero III* rolls off and away to a low crouching shadow upon the skyline. We have left Tower Island; we are leaving the Galapagós after only a month's sojourn through those quiet waters. But there is a fur seal snuggling down in her cage, with a pup beside her, only a few feet away. And there are other cages and other fur seals aboard—a half dozen in fact, including two burly young bulls.

Charles Haskins Townsend, in his report of the Astor Expedition in 1930, speaking of the wholesale slaughter of these animals in the past, remarks that this "peculiar fur seal (*Arctocephalus philippi*) of the Galapagós Islands, . . . formerly abundant, is, probably, near extinction as none have been seen during recent years."*

This being the case, as noted several years ago, the *Velero III*, of the Hancock Expedition, may consider herself fortunate not only upon this voyage but also upon that of 1932 when she brought home a mother and pup—little beasts now as playful as dogs in their pool at the San Diego Zoo. Like the California elephant seal in its present refuge at Guadalupe Island, apparently, the race of Galapagós fur seals is yet in a way to survive.

"Zoonooz" such as this from "the world's end" is now possible on the West Coast

through Captain G. Allan Hancock, whose interest in the Galapagós has become fixed. His many years of cruising through the Pacific coastal seas, from Alaska to Ecuador, appear to have found a very happy point of focus in the classic hunting grounds of Darwin, offering to certain scientists among his guests of long standing, as to others, indeed, of more recent association, the advantages of a rather pertinent comparative study on the field.

Considering what differences do exist, remarkably slight as they may be in many instances, between the natural life of Pacific and Atlantic waters, and considering further the very singular nature of the Galapagós themselves as apart from that of proximate mainland shores, there would seem to be a call especially for all of the West Coast experience and intelligent interest that can be mustered.

By the scientist, of course, it will be realized at once that what work we have done in the course of this voyage can become material of established worth only after some years have been passed in laboratory and library by our own and other specialists. This brief report, dependent as it is upon what contributions and suggestions have been at hand aboard ship, is prepared, therefore, only as memoranda of tasks undertaken by the Hancock party of 1933, and of certain fields of research and other activities that have held its general or concentrated inter-

*See Bulletin: New York Zoological Society, July-August, 1930.

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ests. As other unpretentious accounts have guided and aided us in many useful ways, we have conceived it fairly as a duty to offer these additional means of correlation to future observers.

Islands visited were Hood, Charles, Chatham, Barrington, Indefatigable, Albemarle, Narborough, James, Duncan, South Seymour, North Seymour, Abingdon and Tower; and our time there was all too precious.

As to our working facilities, (if not also our inclinations) Captain Hancock's new thousand-ton motor vessel is, perhaps, representative. She was not designed strictly for the academic harness; but, barring such elaborate gear as deep-sea dredging apparatus and other means of exploring the gloomier depths, she has more than proved her adaptiveness.

Appreciated greatly by the Hancock party has been the vessel's ability to cruise

nine thousand miles before bothering about fuel or water; and more than a convenience has been the mechanical resourcefulness—the almost infinite capacity of her shops and her men to repair any breakage or replace any loss or to build whatever instrument may be needed for the fulfillment of tardy inspirations. "If we haven't it, we can make it," would appear to be among the working codes of Captain Hancock and his chief officer, "Charley" Swett.

Her photographic appointments, including laboratory and general supplies, are also remarkably adequate, given as they have been not only to the commonplace still and motion picture, but likewise to microphotography, to some chromatic work, and to incidental submarine experiment. To the demands of the zoologist, particularly the specialist in fields of ocean life, her elaborate stores have generally answered; while her



GALAPAGOS FUR SEAL

GALAPAGOS ISLANDS



SEA LIONS, ALBEMARLE ISLAND

decks, supporting a small fleet of boats for many special requirements, have afforded space for an aquarium, and for a menagerie of several hundred living specimens, sheltering also much of the labors of science.

The scientific staff has confined itself almost wholly to the general zoological realm, with interest concentrated upon carcinology, herpetology, ornithology and en-

tomology. Regrettably, our ichthyologist has been a rather casual, collective entity, all too ready to leave the classifications of our daily hauls, by means of trap and net, to the future, while those confronted with the very intricate problems of the aquarium wait and pray. Almost tragically, too, incidentally, our botanist exists not at all.

Other guests, such as photographers, stu-



DR. H. M. WEGEFORTH AND LAND IGUANA

dent zoologists, and lay members of the ship's proud orchestra, have either given their spare time, or devoted themselves exclusively to what task of science have been assignable.*

*Personnel:

- G. Allan Hancock, master of *Velero III*, leader of expedition.
- W. Charles Swett, chief officer and photographer.
- H. M. Wegeforth, physician, representing San Diego Zoological Society.
- Waldo L. Schmitt, carcinologist, representing Smithsonian institution.
- John S. Garth, ornithologist and entomologist, representing University of Southern California.
- C. B. Perkins, herpetologist, representing San Diego Zoological Society.
- Louis Filley, assistant photographer.
- Fred C. Ziesenhenné, assistant zoologist, representing University of Southern California.
- Herman Marsh, field collector.
- Sterling Smith, field collector.
- Ray Elliott, Jr., student zoologist and collector.
- George Hugh Banning, writer.

II

REPTILES*

The Giant Tortoise. If the "galapagó"—the prodigious giant tortoise from which the islands took their name—is to survive, it is scarcely probable that his native soil will provide the environment. A few hundred years ago, perhaps, the worst enemy of this ungainly galapagó was his natural carelessness, his propensity for tumbling over the brinks of things, for club-footing his way into lava crevices, for hobbling over precipices, or down the dark shaft of some volcanic vent. At Charles Island, where the creature is presumed to be extinct, we found, after breaking through a bit of brush near the trail at Post Office Bay, the ancient remains of several of these monsters. They

*Prepared with the assistance of Dr. H. M. Wegeforth and C. B. Perkins.

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were at the cavernous base of a volcanic pit from which no such reptile could have freed itself.

Such hazard to the hapless tortoise, however, was all but negligible as compared to the scourge that followed the coming of the white man early in the sixteenth century. Then it was that two or three processes of real extermination began.

Well on the road to extinction in the white-sailed days of the whalers, when these edible reptiles were carried away by the thousands, many thousands have since been

taken, not only for food but for oil, while such imported animals as the dog, hog and cat, now thriving in a wild state throughout much of the old tortoise country, have well nigh done for the rest through the destruction of eggs and young. But for these imported animals, introduced by the whalers and by the various ephemeral colonists from Ecuador, it is likely that the Charles tortoise (*Testudo galapagoensis*) would still be with us; and it is possible, even despite them, that he is.

Upon our leaving Charles Island, Febru-



MEMBERS OF THE EXPEDITION

Standing: C. B. Perkins, G. Allan Hancock, H. M. Wegeforth, Waldo L. Schmitt. Sitting: Ray Elliott, Jr., Louis Filley, W. Charles Swett, George Hugh Banning, Sterling Smith, Hermann Marsh, Fred C. Ziesenhenné, John S. Garth.



COLONY OF MARINE IGUANAS, ALBEMARLE ISLAND

ary 7, it held eight "permanent" inhabitants, one of whom claimed the discovery of a small tortoise which had since died and been thrown away. Neighbors, several miles distant, testified that they, too, had seen it; and, though it was agreed that someone might have transplanted the creature from some other Tortoise island, at least, the possibility remains that the trove was significant, that it may have been one of a surviving Charles Island species. Yet here and elsewhere, during rather extensive inland wanderings

through the tortoise lands, not a single galapagó in its native state did we find.

Having procured a round dozen of the creatures (as yet unclassified) that had been imported from the archipelago to Guayaquil, we were able to acquire only six other captives from natives among the islands themselves—five originally from Indefatigable (*Testudo porteri*), and one of Albemarle whose species has yet to be determined. This Albemarle specimen deserves especial mention. Given the name of "Peterson" he



MALPELO ISLAND "SKINK" (CELESTUS HANCOCKI)

has already received especial attention from his owner, Captain Hancock, and is likely to go on enjoying it as long as he lives.

Peterson weighs a hair's weight less than five ounces! He is a baby giant with a shell-length of 3 7-16 inches, a shell-breadth of $2\frac{3}{4}$ inches, and a thickness of 1 13-16 inches. Every month hereafter Peterson is to receive another physical ex-

amination. It is well known among zoologists that the growth of a tortoise is very rapid, hence the hopes of our naturalists lean toward a positive key by which to determine the age. Peterson, a pride and permanent fixture of the *Velero III*, may provide an interesting study.

Our departure from Chatham Island left a keen disappointment with certain members

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of our party who had expected to remain somewhat longer. At Wreck Bay they had been told by travelers from Progreso, a settlement not many miles inland, of a Chatham tortoise (*Testudo chathamensis*) recently taken by the natives. Thus we pass on with the hope that this prodigy, of a species said to be nearly extinct, may later fall into responsible hands for the survival of the galapagó race.* For it is well, indeed, that the creatures are being colonized in other lands. What science is now taking away from the islands—what very few specimens it has been able to take—is clearly a justified salvage.

The *Velez*'s 1933 collection of eighteen is to become, with the exception of Peterson and two others, a part of the San Diego

*We have since heard that the Astor Expedition, arriving shortly after us, learned from the natives of Chatham that this rare specimen had already been killed for its oil.

Zoo. There, in a seven-acre tract of tortoise grounds and ponds, these galapagós, as the past has proved, may thrive.

Land Iguana. We have already shown that the Galapagós fur seal is still with us, and that furtive hopes have arisen with respect to the tortoise of Charles. But as we sometimes reminded ourselves, in view of other observations, and especially where the more remote interiors were involved, the less faith invested in reports as to the rarity or apparent extinction of certain Galapagós fauna the greater become the possibilities of discovery.

In more recent years nearly all formal expeditions to these islands, including our own, have made much ado of their inland wanderings that we may well begin to suspect ourselves of the need for a better pair of legs. After all, though the difficulties in the denser jungles of seeing far beyond the



FLIGHTLESS CORMORANT, DRYING WINGS AFTER STORM



BREEDING COLONY OF FLIGHTLESS CORMORANTS, ALBEMARLE ISLAND

nose may be considerable, those of travel might readily be disparaged by any youthful tramp of our own western deserts. Yet Science (perhaps, not so youthful), when she turns her eyes upon those scraggy hills—when she contemplates Hood's thorns, Tower's maze, James' and Indefatigable's entangling thickets, or the tottering, collapsing clinker of Narborough and Albemarle—appears to develop a peculiarly unbalanced attachment for the sea. There, indeed, the shores are every fruitful; and she is seldom left to whistle for her pay.

A two-day journey over the southern regions of Albemarle left us "whistling" insofar as land iguanas were an object. Other shorter tramps over the northern part might well have been equally fruitless; some of them were. But, as a significant reminder of our fortune in the previous year when two specimens were taken from the island, we did chance upon another (*Conolophus subcristatus*) now represented among others of the species in our ship's menagerie. Yet, in view, particularly, of this island's great expanse, it should not be very startling if col-



PELICANS, ALBEMARLE ISLAND

lectors of the future should come upon these supposedly rare denizens of Albemarle in some numbers. At least, it is easy to fancy some iguana of the interior making it known to his fellows that: "The scientist, among the *Homo sapiens*, is nearly, if not quite extinct, none having been reported on this mountain side since 1906."

On Barrington, an island that would scarcely fill one of Albemarle's largest craters, the land iguana was also believed to be rare. This being the reputation of a very

small lump of very traversable land, the sacks that we carried ashore for the catch were not filled with the highest hopes. They were filled with iguanas, however, in a very short time—the *Conolophus pallidus* known to Barrington alone. Two were taken only a few hundred feet from the sea; and at a point about two miles inland from the northeast shore, not far from the now deserted colony mentioned by Slevin,* we gathered

*Slevin, Joseph R. "Log of the Schooner Academy on a voyage of scientific research to the Galapagos Islands, 1905-06." (San Francisco Academy of Science. Pub. Feb. 14, 1931.)



BLUE-FOOTED BOOBIES, DAPHNE ISLAND

a dozen from the lava rocks—as many, in fact, as we wanted of this isolated species.

Thus, as the “extinct” tortoise of Hood was recalled to “rarity” by the Pinchot Expedition, was the “rare” land iguana of Barrington reduced fairly to the commonplace by the party of Captain Hancock. No doubt the “rarity” of this iguana may be attributed only to the fact that his habitat had been rarely visited; and by the same token may we hope that the scarcity of certain other Galapagós fauna may be traced to a similar circumstance.

For the perpetuity of the land iguanas, though their numbers have diminished vastly in the course of centuries, it may be that no immediate measures are necessary. But it was made known to me, as an item of some concern to science, that the *Velero III* last year, by way of experiment, had taken the responsibility upon herself to colonize the island of North Seymour with the species *subscristatus* taken from her immediate neighbor and namesake of the South.

In 1932, it appears, the South Seymour iguana, despite his great numbers, was not

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faring very well for lack of sufficient forage. On the adjacent North Seymour, where land iguanas were unknown, forage was far more plentiful. All other conditions, apparently, ideal. Of course, it was realized that the practice, and, especially, the irresponsible practice, of rearranging the island fauna, might lead the investigations of others somewhat afield. Hear ye, therefore, and be it known nevertheless, that some seventy iguanas (*C. subscristatus*), including a second transport, have been carried across the channel from the southern to the northern Seymour, investigations having shown to our utmost satisfaction that the emigrants of last year were still there and doing splendidly.

Land iguanas have done well also in their home at the San Diego Zoo, where they flock in response to the feed wagon's rattle, like the proverbial boarder at the sound of the bell. There, though they often sniff at

all this hullabaloo California has made of her sunshine, they have thriven in it, as also upon a diet of cabbage, carrots, tomatoes, lettuce and bananas, with pads of cactus as roughage, reminiscent of their native land. Here, aboard the *Velero*, are the future boarders of that zoo, palpably tame and responsive; and while, at first, the elite Conolophus of Barrington scorned the cactus fare of the Seymour plebeians and must have his bananas or nothing, his disposition is changing. In fact, he has now the best disposition of them all.

Marine Iguanas. Of marine iguanas (*Amblyrhynchus cristatus*) our collection includes no living specimen; and, indeed, during this voyage no such inclusion was seriously attempted. These dark little Mahatma Gandhis are paragons among the hunger strikers of the world. We, like many others who have in the past held vague



BITTERN ON ROCK, JAMES ISLAND



GALAPAGOS FINCHES EXTRACTING MOISTURE FROM A CACTUS STUMP

hopes of inuring a few specimens to captivity, who have carefully examined the stomach contents and offered such tidbits of sea vegetation as should have warmed the cockles of their stubborn hearts, report no success.

To attempt forced feeding through those obstinate jaws is to break the teeth, with the result of sore-mouth and death. It has seemed to me that their contemptuous little sniffs, and shaking gestures of scornful laughter were a most graphic expression of their regard for civilization. Theirs is the school of Patrick Henry—give them liberty or death.

Excluding Charles Island, where hungry colonists of old appear to have exterminated all iguanas, we have observed the marine variety broadly in the tidal areas over all the major islands, oftentimes, as on Narborough and Albemarle, in black companies

that darkened the already somber complexion of the shores. Like those infesting the sands and the broken flows of lava near Tagus Cove, some specimens were nearly, if not quite, as large as any of their inland cousins. On Tower we saw only dwarfs.

We were fortunate in our arrival during nesting season. It was February 17, at Eden Island in Conway Bay, that we found their burrows just above the high tide line, and secured a number of eggs. The burrows, tunneled into the sandy slope to about the length of the arm, reached a maximum depth below the surface of from twelve to eighteen inches. Three holes contained good eggs to the numbers, respectively, of three, four and six; other holes, containing spoiled eggs, appeared not to have been formerly molested.

At Tower Island, February 25, an egg specimen was returned to us from a burrow

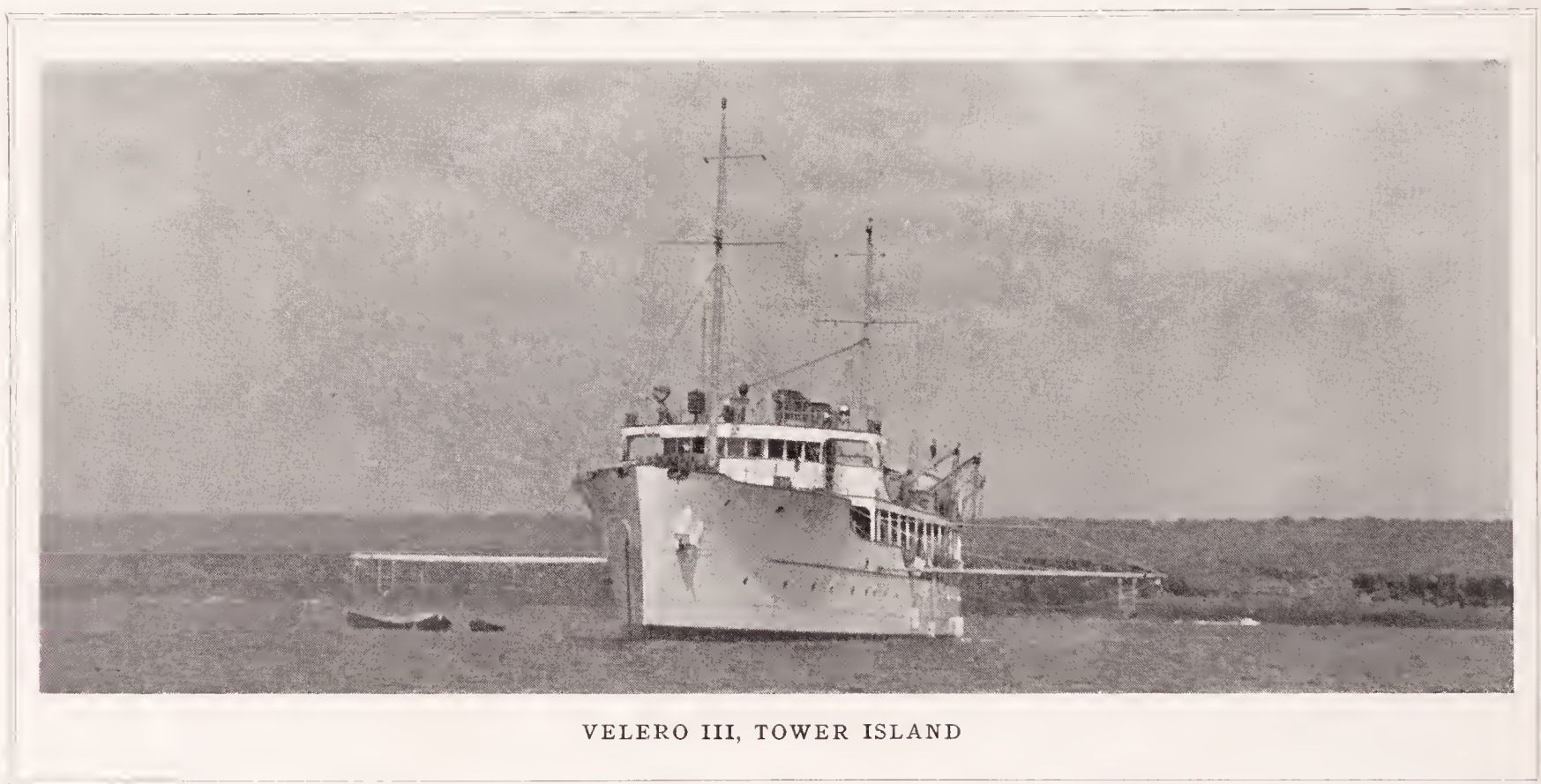
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in a loamy soil, discovered some two hundred feet from the sea at an altitude of about forty feet. This being a burrow of one of Tower's dwarfs, the dimensions of the egg, as compared to those representing Eden, may be of some significance: The short circumference of the Tower egg was 116 m.m. with a length of 72. The short circumferences of three eggs measured from Eden were 148, 142, 144½, with respective lengths of 80, 81 and 76 m.m.

On several occasions, during visits of the *Velero* this year and last to Indefatigable

defatigable three (*D. steindachner*); at Barrington twenty-one (*D. dorsalis*), most of the latter from near the deserted iguana colony mentioned above.

Among the lizards no geckos (*Phyllodactylus tuberculatus*) were taken, and but one observed—that elusive little chap on the inner wall of the warehouse (*cantina*) at Wreck Bay! But our collection of *Tropidurus* is formidable enough, the live specimens diminishing in numbers as the snakes grow hungry, according to the laws of nature and herpetology. These lizards, too



VELERO III, TOWER ISLAND

Island, a number of the smaller creatures were beheld a quarter or a half mile off shore. They were crossing the cove at the head of Academy Bay, swimming with the free undulations of tail suggestive of the "salamander." Elsewhere throughout the islands no such voluntary aquatic feats were noted. The shark menace may explain it; but there at Academy, and not far from these able swimmers, several sharks were observed.

Other Reptiles. Of the other Galapagos reptiles—lizards and snakes—there is little to say. At Hood three snakes (*Dromicus hoodensis*) were observed, one taken; at Duncan two (*D. slevini*) were taken; at In-

defatigable three (*D. steindachner*); at Barrington twenty-one (*D. dorsalis*), most of the latter from near the deserted iguana colony mentioned above.

The *Tropidurus grayii*, of Charles Island, probably, the least common of all the Galapagos species, we observed in some numbers at a cove just beyond Cormorant Point, eastward from Post Office Bay, most of them near the beach, yet some on the steep crater walls a few hundred feet above. Along the beaten trail from Post Office Bay to Black Beach, as at other places some distance inland, we observed none.

Needless to say, all these reptiles of the

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Galapagós are virtually harmless. The snakes did not offer to bite; and, while the land iguana is certainly capable and willing, his bite is not dangerous; and he is helpless when properly handled.

III BIRDS*

THE coastline of Albemarle Island and adjacent Narborough, in the immediate vicinity of Tagus Cove, is the scene of a dramatic struggle against encroaching civilization. Here two rare species, the flightless cormorant and the penguin, are making a gamy stand against almost inevitable extinction. Unmolested, their natural increase would offset the supposed depredations of sharks, of harassing gulls, or of an occasional nest-robbing hawk; but with man

in ruthless pursuit, their doom is sealed unless immediate measures are taken to conserve the few remaining individuals.

It was with this purpose in view that the Hancock Expedition secured breeding stock of both penguins and cormorants. Under expert observation in the San Diego Zoo it is believed that enough may be learned of the habits of these strange creatures to make possible their propagation in captivity. The mild climate of the southern city is exceptionally favorable to such an undertaking, and the large swimming tank will allow them almost unlimited freedom. A year-round existence in the open air should prove infinitely more successful than a resort to confinement indoors under artificial heat.

Regarding the continued existence of penguins and cormorants in the wild state, the Hancock Expedition is justified in making a more favorable report than that of either

*By John S. Garth.



MASCOT "BILLY HOOD," FROM HOOD ISLAND



VELVET CRAB. (Actual Breadth $\frac{7}{8}$ of an Inch)

Disguised in a cloak of rich brown velvet, *Ozius verreauxii*, scuttles from one place of concealment to another, ever eluding the pursuer.

Beebe or Astor. Three days were consumed in making a thorough survey of the Albemarle coast from Perry Isthmus on the south of Albemarle Point, the northerly projection of the island, and of the Narborough coast from Mangrove Point to a point opposite Tagus Cove. From our observations we concluded that both birds are well established throughout this entire area. Several hundred cormorants were seen.

Penguins are not so easily estimated because of their habits of "hiding out" among the rocks. The writer observed a dozen between Tagus Cove and a point four miles south, but is satisfied that there were many more which his 10-power binoculars failed to reveal when scouting from a small launch. Add to this the fact that penguins were observed by the party, a pair in each place, at

Cartago Bay and at Duncan Island, and the chance for survival is as good as, or better than, that of the cormorant.

No island could be in more complete, undisputed possession of the birds than Tower. As the *Velero III* sailed into Darwin Bay, which, probably, is itself a crater broken down at the southeast rim to admit the sea, hundreds of frigate birds soared overhead, swooping now and then to harass the gull or booby. The red-billed tropic bird or bo's'n dipped in graceful salute, its long-tail plume a pennant of gossamer. Flocks of sheerwaters and petrels crossed and recrossed our bow. A circle of the bay by skiff revealed forked-tailed gulls and noddy terns nesting, the former a pearly silhouette, the latter dark and indistinguishable against the black lava cliffs. In shore, one could not step

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more than a few feet without treading on helpless man-of-war birds or stupid boobies. These imbeciles were of two species: the red-footed in both brown and white phases, and the green-footed, easily confused with the white phase of the red. Yellow-crowned night herons kept elusively out of arm's reach; but mocking birds, doves and finches hopped over our very feet.

Coming from Santa Elena, the most westerly point of South America, and the one which juts furthest toward the Galapagós, the writer is in a position to speculate as to the possible relations between the land birds of the archipelago and those of the adjacent mainland. Pending classification of the mainland species, this can be speculation only, and the writer attaches no more significance at present to his observations than that of superficial resemblances. It is, how-

ever, a remarkable fact that of the prevailing insular groups—finches, warblers, mocking birds, flycatchers and doves—there should be continental prototypes which, barring size, are practically indistinguishable in the field from their Galapagós relatives.

The brilliant flycatcher, so common about La Libertad, Ecuador, is not a bit more vivid than his diminutive cousin of Charles Island—a bird taken abundantly along the trail from Black Beach Anchorage to the mountain retreat of the Baroness Wagner.* The olive flycatcher of the brea pits at Santa Elena was a bird of similar appearance to the several species which inhabit their respective islands of the Galapagós group. The mocking bird, or mocking thrush, found most commonly on the islands

*One female flycatcher was seen at Chatham and another at Academy Bay, Indefatigable.



SWIMMING CRAB. (Natural Size)

Denizen of the deep, *Cronius ruber*, was caught by chance in the lobster trap.

of Barrington and Hood, although encountered on others, might be separated from his mainland relatives for practical purposes by his complete lack of fear as compared to their man-taught wariness. Only the finches of the genus *Geospiza* have no analogous mainland forms. Their relatives must be sought in the islands of the Pacific. This similarity between South American and Galapagóan bird life must be born in mind whenever the possibility of a former connection with the mainland is considered.

The shore birds, as has been remarked by earlier writers, may be separated into migratory and non-migratory species solely upon their response to man's approach. Those which exhibit no fear, and may be picked up by hand, do not fare farther than the limits of the archipelago. Of this class are the little green herons, the Galapagós yellow-crowned night heron, flightless cormorant, penguin and forked-tail gull, although this bird was seen about Malpelo. Birds which show uneasiness and take to flight at man's approach have learned this protective reaction in the course of seasonal migration. Curlew, stilts, sandpipers, oyster-catchers, and great blue herons behave in this manner, although here the latter are much easier to approach than in the salt marshes of Southern California.

Two of the greatest thrills for the lover of birds have been experienced by members of this expedition. To hold in one's arms a living, lashing, biting, thrashing albatross was the rare privilege of Sterling Smith and myself at Hood Island. The rookery was deserted save for one great bird which had outstayed his companions. He dashed about the rocks in a frantic attempt to escape our clutches but was unable to rise from the uneven lava because of the enormous weight of his body. We regretted, indeed, that it proved impossible to bring him alive to the San Diego Zoo. The second sight was shared by several, including Dr. Wegeforth, who secured a remarkable set of motion pictures.

Twenty-two flamingoes rose from their feeding ground in a Post Office Bay lagoon and flapped in perfect formation, circling the lagoon three times before coming to their characteristic dead-stick landing. Only three young birds, presumably, one season old, failed to share in this exhibition.

We were highly elated to find the Galapagós fork-tailed gull so well established on Hood Island. With known breeding stations on Tower, Daphne, North Seymour, James and, possibly, Malpelo, where the birds were seen in pairs; but where the nests could not be investigated because of their inaccessibility, the chance for the survival of this queen of the tropic seas is greatly increased. There is a probability of colonies on the northern islands of Abingdon and Bindloe, Culpepper and Wenman—may we later hear the news.

IV

INSECTS*

IT was Darwin who observed that only the barren plains of Patagonia sustain a more meager insect population than the Galapagós Islands. Our experience corroborates this statement insofar as the islands are concerned. Here is a paradox indeed: Imagine a tropical island without the drone of insect swarms! Imagine a part of equatorial South America, the butterfly collector's paradise, without a brilliant blue *Morpho*, a red and black *Papilio*, or even a lazy, long-winged *Heliconius*! Yet the insects of this archipelago, although lacking in size, brilliance, or number of species, offer the entomologist a fascinating field for the pursuit of his study, and to the layman a number of the most bizarre bugs and beetles which he might encounter anywhere.

As the bright red Sally Lightfoot crabs

*By John S. Garth.



"SALLY LIGHTFOOT." (Natural Size)

The most abundant and conspicuous member of the Galapagos crustacean fauna is the scientists' *Grapsus grapsus*.

are the dominating life of the shoreline, so the attractively-painted red and yellow grasshoppers become the most familiar feature of the inland stubble-covered plains. A dozen of these uncertain-where-to-land aviators are constantly in motion ahead of the hiker, he sometimes having to ward off their attempts to pitch headlong against his head and body. By night they fly aboard ship and are frequently captured by the watch officer, who is glad to have his monotonous shift broken by a "hopper" invasion. Other than size, no difference is noticed between the grasshoppers of the various islands, although the Tower Island species appear to be distinct.

An all-day hike to the higher elevations of Charles Island netted a selection of all the known species of Galapagos butterfly.

There are only five in all: a tiny blue (*Leptotes marina*), a dwarf yellow (*Catopsilia eubule*), a similarly stunted fritillary (*Dione vanillae*), the cosmopolitan monarch (*Danaus menippe*), and the Galapagos long-tailed skipper (*Eudamus galapagensis*). The latter is the only one restricted to the islands, the others being found throughout the tropical and sub-tropical regions of the Americas. They are only half as large as their continental brethren, the struggle for existence being more severe in the barren archipelago.

The carpenter bee (*Xylocopa*) from Charles Island and a mantis from Barrington, are two of the most interesting finds. The former builds a series of compartments in the core of the agava (in California the yucca), sealing each after depositing the egg. By the time the last home is finished

the first insect is quite well developed on food supplied by the thoughtful (?) parent. The mantis is a notorious carnivore, devouring with eager haste the bodies of its more unfortunate insect enemies.

Moths, attracted by the ship's lights, fly aboard almost every evening. Microscopic beauties, the scientist's "Microlepidoptera," are the most abundant. Now and then a Geometrid, Pyralid, or Noctuid enriches the catch. Rarely a Sphinx or hawk moth is captured. Mosquitoes are reported bad on shore, but our mile-away anchorage plan keeps the ship free of these pests. There is no malaria in the islands.

Although fresh-water insects are too well known to need mention, it will come as a surprise to some to learn that insects also live in the ocean. In the Galapagós archipelago the marine insect is Halobates, the water boatman. However uncommon, he was taken in several of our nightly plankton hauls, attracted by the brilliant light at the gangway. To and from the surface he darted with a speed not inferior to that of the phosphorescent worm and squid, flashing beneath the water. It is believed that Halobates remains always at sea, depositing eggs on what flotsam and jetsam may collect north of Albemarle, where two great ocean currents meet.

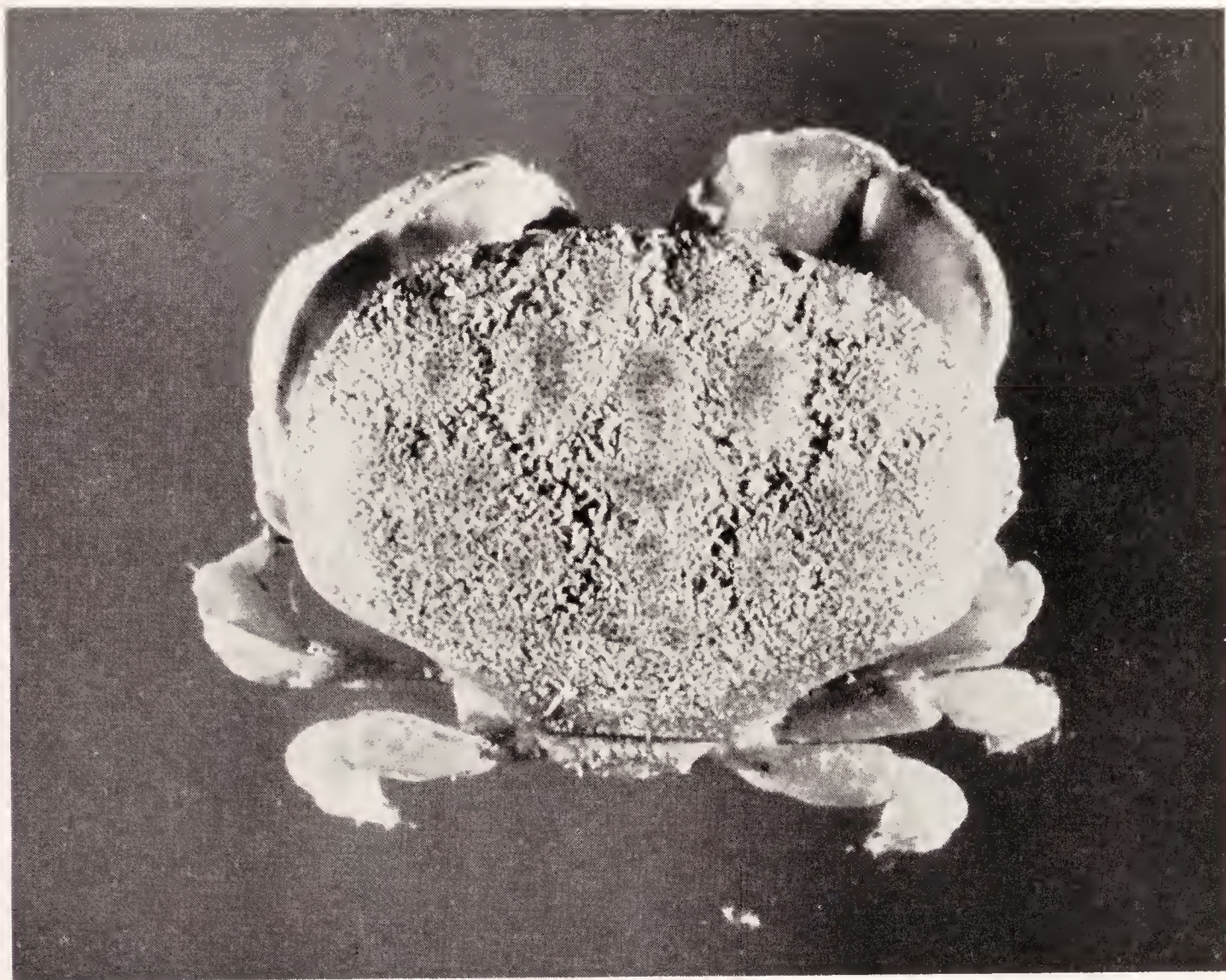
Sharing interest with Halobates is a marine spider, Dasis, which lives beneath the rocks at the bottom of tide pools. Several of these spiders were encountered at various collecting stations, but no sign of web was observed. Recorded once before from the Galapagós, Dasis is found again more than a thousand miles to the southward on Juan Fernandez Island. He is, unmistakably, a spider, and should not be confused with the common marine Archnid, Pycnogonum, which he not in the least resembles. Pycnogonum might easily pass for a crustacean.

Worthy of especial study by a careful entomologist are the flat flies (*diptera*)

which make life miserable for the birds. These flies are so constructed that they can slide in between the feathers and be absolutely concealed. Our taxidermists found that unless gulls, hawks, cormorants, boobies and other birds were thoroughly fumigated before the work of skinning commenced, these pestiferous parasites would forsake their avian hosts and seek to hide in the hair of the nearest human being.

Our most effective way of combating this nuisance was to enclose the dead bird in a flour sack and fumigate the whole in a tight, tin box. A dozen or more flat flies would be found afterward in the folds. On the supposition that each species of bird might have its own species of fly, the parasites of each individual were kept separate and labeled with the name of the host bird. Specimens will be placed in the hands of a competent dipterologist.

The small size and drab coloring of most Galapagós insects led Darwin to conclude that neither excessive heat nor intense light, both of which are present in the islands, is the cause of the enormous size and brilliant coloration of many tropical insects. Given these two conditions it is the writer's thought that, at least, two others must also obtain. Increased rainfall, resulting from the possible moderation of ocean currents and prevailing winds, and rich soil replacing lava boulders, would be necessary before the bleak Galapagós could support the teeming insect population of the adjacent Ecuadorian jungles. Then the Galapagós, having lost their individuality, would cease to be the mecca for the scientist and explorer.



PEBBLE CRAB. (Actual Size $\frac{3}{4}$ Inch Carapace)

Hitherto known only from the type specimens, *Platypodia gemmata*, was all but common at several of the expedition's collecting stations.

V

CRUSTACEA*

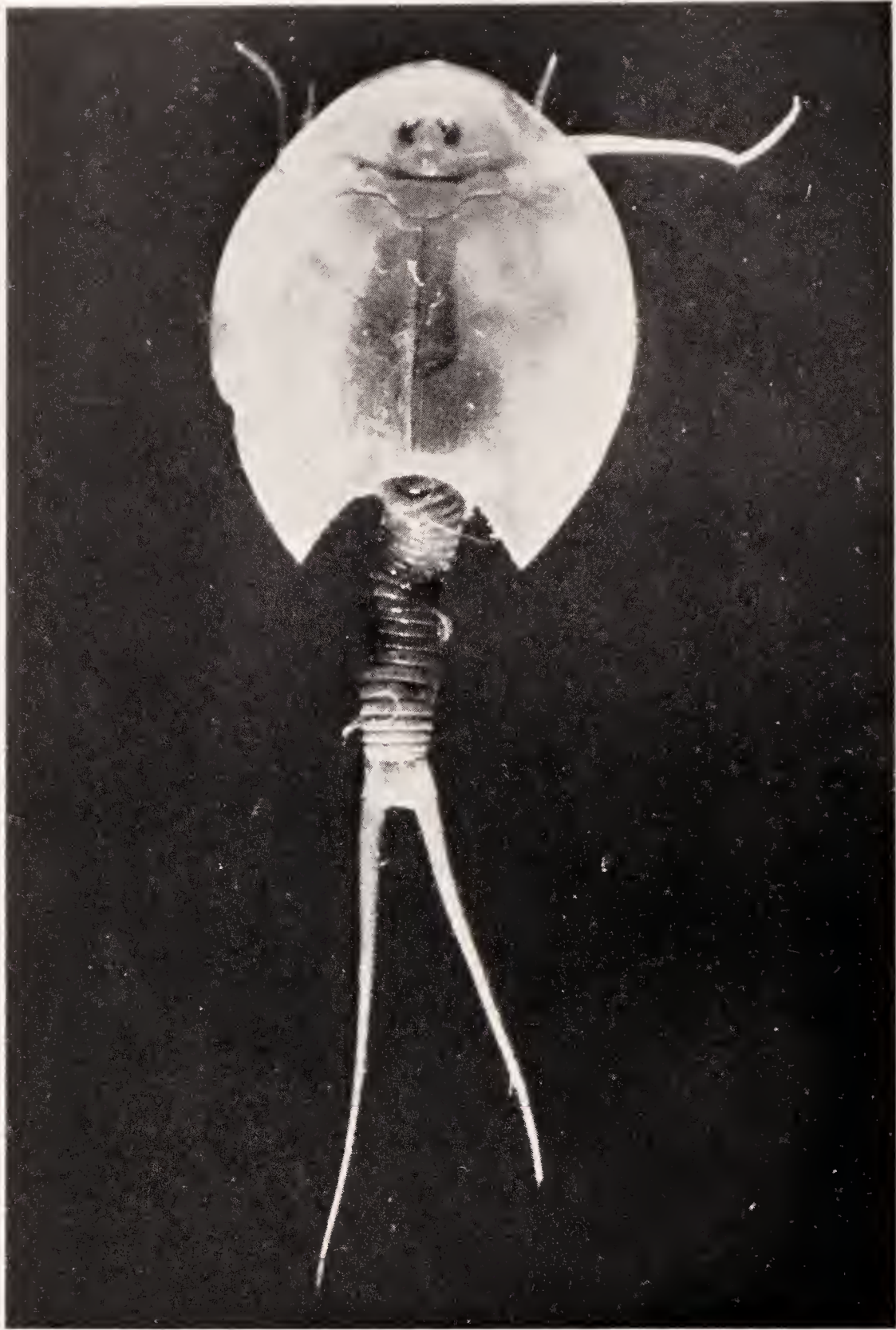
IT would appear from a preliminary survey of our collection of crabs, shrimps, "lobsters" and the like, that the Hancock Expedition to the Galapagós, of this year, had more than paid for itself, in a scientific way, on the basis of crustacean returns alone. This is due in part to the intensive manner in which carcinological collecting has been pursued by the entire scientific staff, and due also to the bountiful yield of these waters indicating a wealth of crustacea far greater than the reports of former expeditions have suggested.

The brachyuran "spider" crabs, excepting

the more common *Mithrax* species, were infrequently met with, perhaps, due to their decorative habits and excellent mimicry. Also of the portunid swimmers disappointingly few specimens were taken in Galapagós waters. The oxystomes among the crabs were most limited in numbers—fewer than a dozen specimens at most, with but a single one of the Dromid-like forms, a tiny *Hypoconcha* or shell-bearer from fifty-six fathoms. But the Xanthids were surprisingly abundant. For example:

The small, readily distinguished crab *Platypodia gemmata*, originally described from one of the four specimens from a reef north of Tagus Hill, has been taken by us from, at least, half a dozen different places including the type locality; as many as sixteen specimens were taken at one collecting station.

*Prepared in collaboration with Dr. Waldo L. Schmitt.



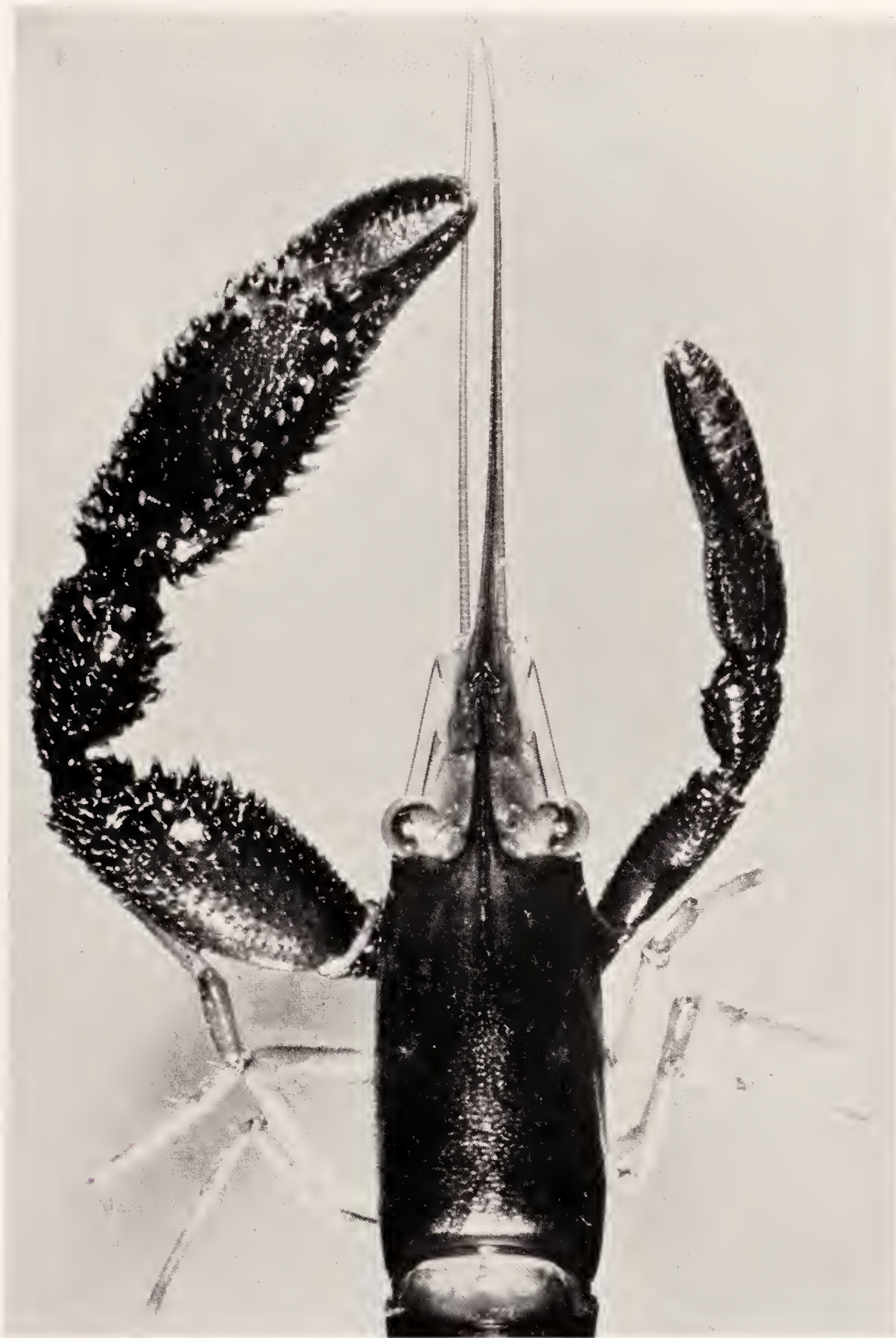
FRESHWATER FORM. (Actual Length $\frac{3}{4}$ Inch)

Apus, a primitive crustacean, inhabits the rain-filled lava crevices of South Seymour Islands.

A very conspicuous bright reddish brown crab, *Trapezia cymodoce ferruginea*, first reported by the Arcturus Expedition from a single specimen taken at Tower Island, was found to be one of the most abundant species not only at Tower but at several of the other islands. Occurring in numbers to be counted by the dozens it appeared in clumps or heads of a Porites-like coral; and with it in all

cases was the very closely related *T. digitalis*, but much less numerous. Less numerous, too, but no less frequent, was the occurrence of a very brilliantly-marked crab, *Carpilodes cinctimanus*, hitherto reported but once from the Galapagós.

In short, Xanthid crabs, of one kind or another, at all littoral collecting stations, appeared to be the most common crustaceans.



FRESHWATER SHRIMP. (Actual Length 3 Inches)

Macrobrachium olfersii, electric blue shrimp, from a stream flowing into Freshwater Bay, Chatham Island.

Even when no others could be found, one or another or several Xanthids, chiefly *Ozius* and *Leptodius*, could be had for the turning of a rock or two.

To the casual eye, of course, this portion of the crustacean fauna is far less prominent, due to its habits of concealment, than are the so-called Grapsoid "rock" crabs (*Grapsus*

grapsus) which in the Galapagós are as striking in their fiery armor as they are omnipresent in clattering armies over all the rocky shores. Two other species of grapsoids—*Pachygrapsus transversus* and *crassipes*—seemed almost as widely distributed as the large grapsus and may be nearly as numerous, their more elusive natures and somber

colors merely holding them less in evidence. The "ghost" crab (*Ocypode gaudichaudii*) the wary and swift inhabitant of all the sandy beaches visited, must also be very abundant; but, as its burrows are so common and so much taken for granted, one fails to estimate their numbers.

Among the anomuran crabs, as prolific as any form of crustacean life encountered, are the *Porcellanid* or "flat" crabs and the "hermit" *Calcinus*. The former are exceedingly elusive, are rarely caught in quantity, but, nevertheless, are present in all rocky situations in great numbers; while the latter, literally carpeting every tide pool and quiet nook, and free for the taking, are almost too common to attract notice. Other hermit crabs were taken—several species; one, a small, undetermined, grayish-white form, characterized most of the boat dredge hauls along with the peneid shrimps. Though few specimens were picked up, the land hermit, *Coenobita*, is not uncommon, his characteristic trails, having been observed on the higher reaches of nearly all sandy shores.

Comparable to the xanthid and grapsoid crabs in frequency of occurrence are the alpheid and peneid shrimps, the former being most abundant in point of numbers and species. It is most surprising that so very few alpheids seem to have been recorded from the Galapagós.

Wherever a xanthid crab was to be had, but little extra or more diligent search was needed to bring to light one or more alpheids, snapping shrimps or "pistol" crabs as they are often called. It is believed that more than a dozen shrimps of the genus *Synalpheus* are represented in our collection, as well as several of the rarer and lesser known genera of Crangonids. Peneid shrimps were the predominant crustaceans in many of our boat dredge hauls.

We were unsuccessful, however, in discovering further specimens of that very rare and unique shrimp *Discias serrifer* Rathbun, taken by the Hopkins Stanford Expedition

of 1896 from a reef north of Tagus Hill. But another rare shrimp, the very beautifully colored *Gnathophyllum panamense*, founded on a single specimen from Panama a number of years ago, disclosed itself as an all but common inhabitant of Galapagós waters. In some locations as many as half a dozen were taken or observed.

Of the smaller crustaceans, amphipods and isopods were collected from all dredgings, and from a number of shore stations as well, with the result that the take of amphipods, at least of the smaller species, has been most gratifying. On the other hand, marine isopods have been conspicuous for their scarcity. Yet, despite the brief time allotted by the crustacean collectors to the gathering of terrestrial isopods, fair collections can be reported from several of the islands.

Most surprising to us was it to learn that phyllopod crustacea existed in rain-water pockets of lava blocks on Albemarle, during the rainy season at least, many of these ponds of the Perry Isthmus, several miles southward from Cartago Bay, being deep enough, as we discovered, for a comfortable bath. Upon returning with Ray Elliott from Conspie Peak, near the active volcanic region, he and Banning observed many of these *Estheria*-like forms, Elliott bringing back several specimens in his canteen for want of another container. Later, in fresh-water pools of South Seymour Island, numerous specimens of an *Apus*, together with a few of a *Branchinecta*, were taken. Though the literature needed to settle the matter is not at hand at this writing, it is believed that these crustaceans may prove to be new distributional records for the species yet to be determined.

Several freshwater crustaceans were also taken at Chatham where there is a permanent stand of water: an amphipod in very moist soil adjacent to, at least, one water course, and two species of shrimp, *Machrobrachium jamaicense* and *M. Olfersii*. Widely distributed though subtropical and tropi-



CAPTAIN HANCOCK AND DR. SCHMITT EXAMINE CRUSTACEA HAUL FROM 56 FATHOMS

cal America, their presence on one of the Galapagos Islands is, perhaps, not so unusual as unexpected.

Of necessity our collecting was restricted largely to coastal regions, with supplementary boat dredging and occasional recourse to the diving hood. Before losing our oyster dredge upon a rugged bottom, however, our one deep-water cast (in fifty-six fathoms, north of Charles Island), provided a bountiful crustacean haul which included eight species of brachyuran crabs. In the course of routine plankton collecting, by means of the electric light and dip net, a number of welcome specimens were taken—most of our larger stomato-pods and a number of our rarely encountered swimming crabs (which seine hauls failed to bring in) having come to us by such means.

Fish traps, laid as a part of the usual day's

work, indicates that the spiny lobster (*Panulirus penicillatus*) already known from these islands, is most plentiful in some regions, awaiting only a suitable market to become a valuable fishery resource; and the same may be said to a lesser extent with respect to the so-called locust-lobster, a Scyllarid, believed by Dr. Townsend, in his more recent reports, to be an undescribed species.

Other Invertebrates. Other invertebrates were saved in quantity, one of the largest and most comprehensive collections amassed being that of the freshwater and marine mollusca which were gathered and preserved on all occasions. *Echinoderms*—sea stars, brittle stars, sea cucumbers and sea urchins—were also saved in quantity, as, in fact, were all groups of invertebrates to include sponges, anemones, jelly fish, hydroids and worms of various kinds. As a basis of a

series of scientific report by specialists in the various fields of our work, it is the plan of Captain Hancock, leader of the expedition, to have all forms of animal life obtained in the course of the voyage studied and reported upon insofar as possible.

VI

ROD AND REEL*

IT was fortunate that some of us enjoyed fishing, for fishing's sake. Aside from the fact that most of us were able to reduce a well-cooked wahoo, grouper or tuna steak to a mere feeling of gastric satisfaction, there were the menagerie and the aquarium to feed, say nothing of the sharks that came to dine at the "diving cage" a few fathoms under the sea.

And fishing is good in the Galapagós. Save, perhaps, among the Revilla Gigedos Islands (some ten years ago) we have seen no fishing to equal it, the truth in many cases being stranger than "fish stories." To hook one fish only to have it swallowed by another, and then to land both! To hear the thump of our launch's propeller as some poor fish tries to gulp it! To see one's hook taken though it dangle several feet above the surface of the water! To sit staring at a fish that has leaped from the sea and come to rest in the fisherman's lap! But lest we begin to appear insincere in this writing, let us pass on.

The most prevalent (and tiresome) fish to our rod-and-reel experience is the common grouper, a brownish bass-like beggar of from two to twelve pounds in weight, caught abundantly in the vicinage of reefs and rocky shores. But for the demands of our menagerie and those of the diving cage we could not have found cold storage room enough for these fish in our expansive plant.

For the sportsman, of course, they provide little sport, but for the table few fishes are better.

The golden grouper is less common by far, and rather more difficult to catch; although one of these striking yellow gobblers it was that struck at the propeller of our lunch—they are all likely to strike at almost anything. To all the groupers we lost many hooks and leaders, until at last we learned his trick of doubling back upon the line and severing it just above the leader. A five or six-foot leader, with a very short piano wire extension at the line end, and the smallest possible eye for the line, or any other leader of about five feet made up in two parts, is a solution. For us the golden grouper was well worth catching; no brighter creature swam in our aquarium, and none better was served at our table. It is a fish much sought by the natives who dry and salt the meat "for codfish."

The skipjack, in the Galapagós is a common catch, and, per pound of weight, is as gamy as any, fighting until pulled into the boat. The largest skipjacks in these waters appear to be about twenty-five inches long, weighing not more than six pounds. With its deep blue back and rainbow shades blending into silver and stripes, few fish of the mackerel family could be called more beautiful. But the dark meat is a bit too strong for the average palate—we used it only for the menageries and as chum for sharks about the diving cage.

The cosmopolitan dolphin—not the porpoise, but the fish—of the high seas, though taken abundantly in neighboring blue waters, is one of the rare catches among the islands, and is prone to measure only three or four feet in length. The coloration is vivid and extraordinary, being shot with electric blues and yellows capable of rapid change. Streamlined to perfection, the dolphin is well known as one of the fastest swimmers of the sea. The flying fish in the air is not always faster, his flight from the dolphin often terminat-

*From the notes of Louis Filley, based upon his experiences on fishing trips with Captain Hancock and Mr. Swett.



ROOSTER FISH, CAUGHT BY LOUIS FILLEY

ing, as we observed, directly in the jaws of the original pursuer. We have watched the fish come from great distances along the surface after the bait. It is a bee line and a greased one; then the scream of a reel. The dolphin is a welcome catch in the Galapagós, not only for the sport, but for the table.

Equally prized for the table is the "cerro," a game little chap, somewhat resembling the Spanish mackerel, but with yellow spots on the sides, and weighing up to eight pounds. When schools of these fish are encountered in the Galapagós, as often they are, the angler may expect to make a

formidable haul without losing interest in the sport.

Barrington, Albemarle and Cocos Islands gave us our best tuna fishing, though on no occasion did these (yellow-finned) fighters tip our scales beyond sixty pounds. This is, perhaps, fortunate; for to the angler in these waters time is a precious element once the fish has been hooked. The shark menace is omnipresent; the angler is likely to land only half his tuna; or the tuna may go the way of Jonah and leave the angler to land a shark. Commercial fishermen from California, using live bait for chum, were able

to bring many tuna to gaff by means of stocky bamboo poles, two or three poles to a fish, and bridle lines; thus making the shortest possible work of each catch, and landing tuna weighing as much, sometimes, as 250 pounds. From the standpoint of pleasure the Galapagós angler may expect more of it from the tuna, rooster fish and wahoo than from any other game of these waters.

We are not likely to forget one incident while trolling in a small launch off Tower Island. There were two rival anglers, one fighting a fish, the other obliged to reel in his line. . .

"Look out!" The fisherman who had had no fish now had one. A great wriggling body, hurtling from the wave, came flying directly at his head. He warded it off. A wahoo floundered in his lap. The wahoo, barracuda-like in form, here reaches a length of about five feet or more. Barracuda-like again, the nose is sharp, but the teeth are comparatively small. When hooked the wahoo is generally off with many yards of line before the angler has had time to gather his wits; and the fight is continuous thence onward unto the gaff. The meat, moreover, is excellent—wahoo was never served to the captive animals much less to the sharks that called upon the diving cage.

The rooster fish, with his buffalo hump and high-standing "rooster feathers," though apparently less common in the Galapagós than either tuna or wahoo, is surely no less of a fighter per pound of weight. Furthermore, to our experience, he is rather more difficult to land. Darting swiftly toward the angler, then suddenly away, he is often able to free himself, and always able to provoke some excitement. Stream-lined like the dolphin, heavy by the head and long-tapering, he may be expected to weigh about fifty, at times, seventy-five pounds. Though not a fish for the table, he is bound to be welcomed by the sportsman. No game fishes of the Galapagós, to our experience, are more capable of putting up a lasting battle. Per-

haps, this was because we failed to catch any sail-fish, one of the rapier tribe, not unknown to Galapagóan waters. During this trip we had the pleasure of viewing these valiants only from a distance as they leaped high enough to leave a skyline unbroken beneath them.

Since any of the fishes above mentioned are capable of accepting almost anything for bait, be it a white chicken feather, a striped lamp wick or what-have-you, the angler seldom knows, while fishing, what the fates hold for his hook. One fishes for nothing in particular in the Galapagós; and tackle should be selected accordingly.

Many of our colorful aquarium specimens were brought in by the rod and reed—golden groupers and various snappers, especially; but by way of brief appendix, perhaps, mention should be made of the trap and net. Hauls by such means were made almost daily, and the receipts were often worth while.

During the Hancock expedition of 1932, Dr. Alvin Seale, of the Steinhart Aquarium of San Francisco, discovered at Chatham Island a new species of freshwater fish (*Mugilidae*, type No. 838, in the collection of the California Academy of Science), now known as *Agonostomus hancocki* Seale. The length is 13.5 inches; the color in life is olive-green, shading into orange on the sides, and thence into white, with orange checks on the belly. There are nineteen rows of scales in front of the dorsal fin, and fifteen rows between the origin of the spinous and the soft dorsal. From this year's expedition another specimen was brought back.

Meanwhile, one of the most difficult tasks has been the transportation of hundreds of living fishes from tropical waters to the Steinhart Aquarium in San Francisco. To circulate sea water through the tanks, and to maintain a certain very limited range of temperature, has been a problem in more northerly latitudes, involving intricate heating devices, and a constant surveillance of

the system. Not more than a half hour was allowed to pass, day or night, without a report on the conditions of the aquaria.

As to the nature of the specimens themselves the classification, as explained in the introductory paragraphs of this report, has been left to the future.*

VII

THE DIVING CAGE

MEANS of observing sharks in their natural state were provided through the construction of a "diving cage" equipped with diving hood, submarine camera, and devices for attracting the callers. Built staunchly of angle-iron and wire, weighing some 300 pounds, the cage was amply large to provide for the free movements of its tenant. From a boom, by means of gantline and winch, it could be lowered into the sea to a depth of five fathoms and raised. A bull-rope, stopped off to check any descent beyond the limits of the air hose, was an element of safety in the event of a parted gantline; and traps for the diver's prompt exit at any instant were emergency devices (which came within an ace of being used on one occasion when a leaky coupling allowed the helmet to fill with water.)

Obviously, this contraption was built upon the assumption that sharks do bite, however much may depend upon the species, the individual or its appetite. And if, of all sharks encountered, a certain "Tiger" (Genus *Galeocerdo*) of Bahia Honda, Panama, had had the temerity of a certain small ground shark (*Carcharinus*) of Post Office Bay, the diver is of the opinion that the wire of his cage would have given way like a mesh of

shoe-strings. Surrounded as he was by bait of all kinds, dangling from lanyards, streaming out with the current, and suspended as he was within the deepest waters of the bay where no mere bottom-dwellers, like sand sharks, were to be his playmates, his experience was not that of the more conventional diver. In fact, it may be more comparable to that of the swimmer amid the flotsam and jetsam (to include flesh and blood) of the shipwreck.

I have walked freely over the shoal bottoms of tropical seas and encountered no sharks at all; and it is possible that what sharks I might have encountered were frightened away by my strange appearance, or by the bubbles belching from my hood. Yet I noticed that the small fishes were seldom troubled by all that, as I often reached out and all but touched them; and it certainly is not my experience in the diving cage that the shark, once sighted, could be deterred from his purpose of snatching food from the cage. Often he took cage, driver and all for a swing through the watery space pending the parting of the chum-line; then back he would come for more.

The creatures were especially bold as their numbers increased, and as the taste of blood aroused them. Whether or not the diver himself was ever the direct quarry in the monsters' eyes must remain a question; but on several occasions it is very likely that only the strong wire prevented further contact. In one remarkable instance the sally of a ground shark, some seven feet in length, was of such direction and impact as to have left the diver with more respect for the courage of sharks than he could muster at the moment for his own.

Ground sharks were the largest of my callers in Galapagós waters, one of them measuring, after capture (by means of hook from the deck) eight feet and eight inches over all. Nor, after some experience with a number of these chaps, was I very eager to meet anything larger—not in that cage.

*As this report goes to press, a letter from Dr. Seale, of the Steinhart Aquarium in San Francisco, refers to one of the common Galapagos Angel Fish (six specimens of which were sent him), with some enthusiasm. This gaudy fish is for the most part black, but saddled by a vivid stripe of white just behind the gills; he fans himself with orange-colored fins as brilliant as flame. "We have never had," writes Dr. Seale, "any specimens in our aquarium which have occasioned more 'Oh, my's!' from our visitors than these wonderful fish which you so kindly sent us."

HANCOCK EXPEDITION OF 1933

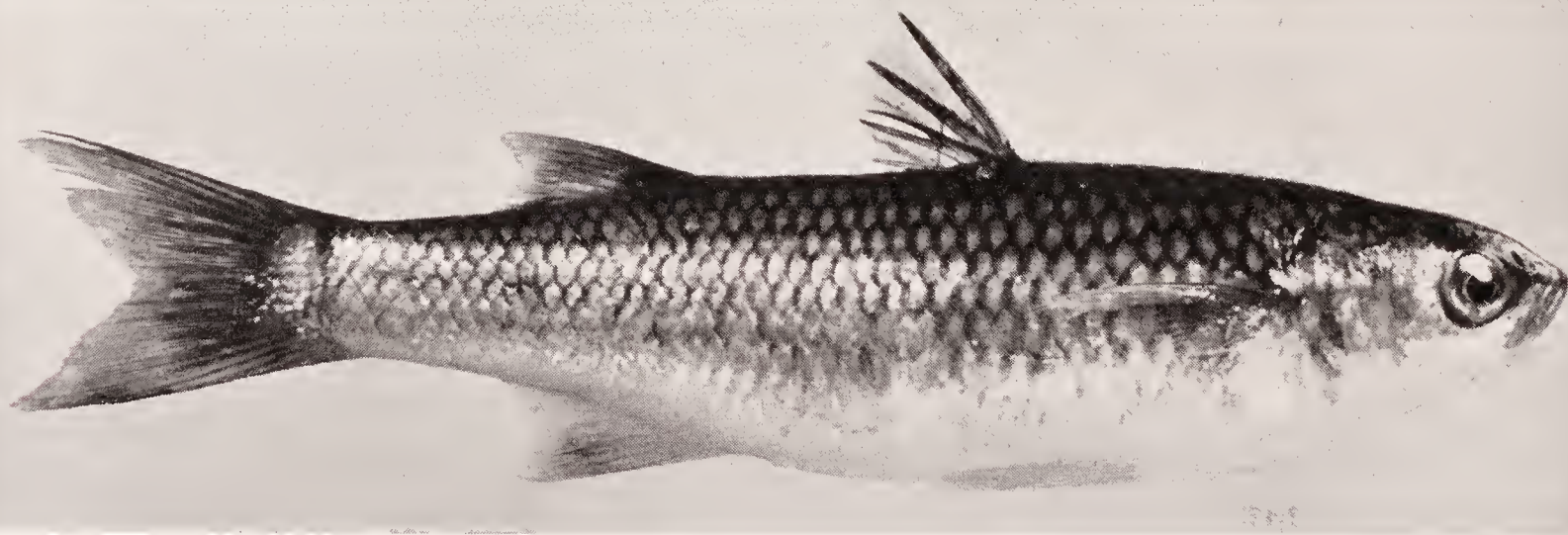
In fact, at Bahia Honda, Panama, where one great "Tiger," upon passing a sixteen-foot skiff, showed himself to be quite as long as the boat, diving ceased to be a pleasure. Before the open jaws of an eleven-foot-eight-inch Tiger shark (by later measurement), all else appeared rather small; but, fortunately, he merely rubbed against the cage as he passed beneath it to take the chum. Once he doubled back upon the fishline that checked him, zooming up before me, less than two feet away; and rather fearful to behold was that broad, white belly, and the height of the monster as he towered above the cage. I was glad that the sixteen-footers did not come to vie with his little brother at the banquet. Generally, when one appeared, another was soon to follow; but on no occasion did I see more than five at one time to include only two of large proportions. I suspect that the meat of an ox or a horse would have served my purpose much better.

Often I went down to behold the night life three or four fathoms under; and here, without inducements from chum of any kind, the sharks swam into range, circling around and around me, venturing close enough to be touched at times, but no more. The sub-

marine light seldom failed to bring them; or it brought the smaller fishes which, in turn, brought the large.

I have seen the so-called pilot fish, holding their positions as though inflexibly suspended, one on either side of the big dorsal fin. By day, on occasions, I have seen runners pass in great schools, vying with trigger fish and groupers for the chum. Once, suddenly, four tuna flashed into the scene, scattering a part of the pageant, and vanishing like streaks.

Still photography alone, in the absence of submarine motion picture equipment, was attempted, and with promising results; but the range of the kodak proved to be too small to get more than a section of a shark when at a distance to meet the needs of visibility. It also happened that when sharks were most active, the conditions of visibility were at their worst. Many dives were made, moreover, when no amount of chum would attract anything into the scene. On such occasions I sometimes signaled the pump man to shut off the air (cut out the bubbles) for as long as a minute at a time; but it did no good. Some patience is needed for what results may come of the cage.



NEW SPECIES OF FRESHWATER FISH (*AGONOSTOMUS HANCOCKI*, SEALE), DISCOVERED BY 1932 HANCOCK EXPEDITION

